

# CRITICAL PLANTS OF THE UPPER GREAT LAKES REGION OF ONTARIO AND MICHIGAN

M. L. FERNALD

(Continued from page 301)

**EPILOBIUM PANICULATUM** Nutt., var. **subulatum** (Hausskn.), comb. nov. *E. paniculatum*, forma *subulata* Hausskn. Mon. Gatt. Epilob. 247 (1884). *E. micranthum* Nutt. ex Hausskn. l. c. (1884), not Pall. ex Hausskn. l. c. 102 (1884). *E. Tracyi* Rydb. Bull. Torr. Bot. Cl. xl. 63 (1913). *E. subulatum* (Hausskn.) Rydb. l. c. 64 (1913). —ONTARIO: Colpoy's Bay, Bruce Co., 1871, *John Macoun*; Hopkins Harbor, Tobermory, Bruce Co., *Krotkov*, no. 7640; crevices and talus of hornblendic cliffs and ledges, Cloche Peninsula, Manitoulin District, no. 3440; about calcareous ledges in dry woods, south of Little Current, Manitoulin Island, no. 3441.

Var. *subulatum* is the extreme of the species about Lake Huron. Typical *Epilobium paniculatum* Nutt. described with "Flowers nearly as large as in *E. palustre*, pale red" has been collected farther east, along the Ottawa River in QUEBEC: Deschênes, 14 juillet, 1921, *Rolland*, no. 15,884. It is a coarser plant, with short pedicels and with calyx 5–6 mm. long, the petals longer. Var. *subulatum* was clearly described by Haussknecht (as forma *subulata*) "Floribus parvis,—5 m.m. longis, petalis calyce sublongioribus; calycis tubo brevi, glabro, 2 m. m. longo. Capsulis 2 c. m. longis, glabrescentibus . . . ; pedicellis capillaribus, 1/2: 1 c. m. longis"; etc. It is the small-flowered extreme of a highly variable cordilleran species; but, having long and slender pedicels, contrasted with the short and stouter ones of the large-flowered typical *E. paniculatum*, its identity is obscured by Rydberg's treatment, in setting up *E. subulatum* as a species:

.....pedicels short . . . . .	2. <i>E. subulatum</i> .
.....pedicels slender . . . . .	3. <i>E. paniculatum</i> .

*E. Tracyi* seems scarcely recognizable as different from *E. paniculatum*, var. *subulatum*; and I fully concur in the second half of Rydberg's statement, when he split *E. paniculatum* into "several forms or species," but all treated as species!, that *E. paniculatum* connects "on one hand with *E. minutum*, on the other with *E. jucundum*." In defining his *E. paniculatum*, forma *subulata* Haussknecht included among the specimens cited Macoun's collection from Colpoy's Bay.

**CHIMAPHILA UMBELLATA** (L.) Bart., var. **OCCIDENTALIS** (Rydb.) Blake, RHODORA, xix. 242 (1917). *C. occidentalis* Rydb. MICHIGAN: woods, Mackinac Island, *Hunnewell*, no. 9329; openings and thickets back of crest of West Bluff, Keweenaw Co., no. 3458.



Var. *occidentalis* is the geographic variety (species of Rydberg) of the Pacific slope from British Columbia to north-central California, eastward into Montana, thence along the Rocky Mountains to Utah and Colorado. Its discovery in northern Michigan, where it is associated with scores of plants of similarly disrupted range, is at least a significant item.

VACCINIUM MEMBRANACEUM Dougl. in Hook. Fl. Bor.-Am. ii. 32 (1834) as syn.; Britton in Brit. & Br. Ill. Fl. ii. 576, fig. 2785 (1897), validation of the name. *V. myrtilloides*,  $\beta$ . *macrophyllum* Hook. l. c. (1834). *V. macrophyllum* (Hook.) Piper, Contrib. U. S. Nat. Herb. xi. 443 (1906).—The common "huckleberry" of the Upper Peninsula of Michigan is typical *V. membranaceum*, occurring otherwise only west of the continental divide from southwestern Alaska to northwestern Montana and the Coast Ranges of northern California. Its mature leaves are membranous, green on both sides, varying from lance-oval to ovate, acuminate above, 3–7 cm. long, 1.5–3.5 cm. broad. In central and eastern Washington and Oregon it passes gradually into a shrub with smaller leaves, 1–5 cm. long, 1–2.5 cm. broad, firmer, usually paler beneath and of an oblong to elliptic outline, with rounded to merely acutish (not long-acuminate) tips. This is

Var. **rigidum** (Hook.), comb. nov. *V. myrtilloides*,  $\gamma$  ? *rigidum* Hook. Fl. Bor.-Am. ii. 32 (1834). *V. globulare* Rydb. Mem. N. Y. Bot. Gard. i. 300 (1900).—Central Alberta (Lesser Slave Lake) and southern British Columbia to Colorado and Arizona. See p. 210 and MAP 7.

A specimen, sent by Hooker in 1835 to Jacques Gay and now in the Gray Herbarium, marked *Vaccinium myrtilloides* Hook. Fl. Bor.-Am. is the small-leaved shrub described by Rydberg as *V. globulare*.

GENTIANA RUBRICAULIS Schwein. MICHIGAN: glades and openings in thickets bordering calcareous beach of L. Michigan, east of Manistique, no. 3482.

*Gentiana rubricaulis*, one of the most definite of species, has been quite misinterpreted. Gray, in 1878, partly understood it but he reduced it to varietal rank as *G. linearis*, var. *lanceolata* Gray, Syn. Fl. N. Am. ii.<sup>2</sup> 123 (1878), giving a partially correct description of the true *G. rubricaulis* from "Minnesota along Lake Superior"; but adding "Also Herkimer Co., New York, Paine," the latter, as shown by his material, being merely a broadish-leaved *G. linearis* Froel. Subsequently, Gray partly cleared the situation, or perhaps further confused it, by publishing *G. linearis*, var. *latifolia* Gray, Proc. Am.



Acad. xxii. 309 (1887), for the "form from Lake Superior," adding the comment: "I have some reason to suppose that it is also *G. rubricaulis* of Schweinitz from the same region."

The segregation of *Gentiana linearis*, var. *latifolia* properly recognized the plant which is unquestionably what had been described as *G. rubricaulis* Schwein. in Keating's Narr. Long's Exped. ii. 384 (1824); but later authors (Britton and Robinson & Fernald) failed to clarify the situation, the former merging with *G. rubricaulis* the *G. linearis*, var. *lanceolata* from "central New York," the latter placing *G. rubricaulis* in the synonymy of var. *lanceolata*. Schweinitz's description was very clear and fragments of the type, presented many years ago to Asa Gray, show conclusively the identity of his species:

28. GENTIANA \* *rubricaulis*, L. v. Schw.

Though there were but two specimens of this *Gentiana*, (one of which I was under the necessity of sacrificing to the examination,) it presents so distinct an appearance that I have little doubt it will prove a new species, intermediate between *G. pneumonanthe* and *G. ochroleuca*. I describe it thus:

*Stem* erect, simple, terete, very smooth and firm, of a red colour; about one foot in height. *Leaves* about one inch in length, alternately opposite at intervals, oblong-lanceolate, of thick consistency, smooth, entire in margin and slightly undulate, obtuse, sessile and sub-amplexicaule or connate at base, with three nerves, the two lateral ones inconspicuous. The upper leaves forming a pseudo-involucrum of ovate leaves, not exceeding the corollas in length. Involucrum and leaves sub-erect. *Corollas* campanulate, erect, sessile, terminal, fasciculate or single, sub-quinquefid. Segments sub-connivent, the interior plait with a single tooth. *Calyx* very small in proportion to the flower, 5-fid.

Appears to have been bluish.

*G. caule tereti glabro rubro: foliis oblongo-lanceolatis, trinerviis, obtusis. Corollis terminalibus fasciculatis sessilibus, 5-fidis campanulatis non ventricosis, laciniis acutis conniventibus; plicis interioribus unidentatis.*

*Hab.* Prairies of St. Peter's river.

A detailed study shows that this characteristic plant of the Upper Great Lakes region, from western Ontario across northern Michigan to Minnesota, with isolated eastern outliers in Somerset Co., Maine and in Charlotte Co., New Brunswick, is quite distinct from *G. linearis*. The specific distinctness of the two was clearly recognized by Kusnezow who redefined the plants which are really *G. rubricaulis* as *G. Grayi* Kusnezow, Acta Hort. Petrop. xiii. 59 (1893), this later appearing as *Dasystephana Grayi* (Kusnezow) Britton in Britton & Brown, Ill. Fl. ed. 2, iii. 13 (1913), where Britton perpetuated the error of assigning *G. rubricaulis* to the synonymy of *G. linearis* and still further carried on the confusion by stating of his *D. Grayi* that



it is "Recorded from central New York." The record from central New York was, of course, that of Paine's broad-leaved (but quite frequent) extreme of *G. linearis*, already discussed. *G. rubricaulis* seems to be particularly common on calcareous areas about Lake Superior and upper Lake Michigan.

APOCYNUM SIBIRICUM Jacq., var. **cordigerum** (Greene), comb. nov. *A. cordigerum* Greene, Leaflet ii. 164 (1911). *A. Farwellii* Greene, l. c. 168 (1911). *A. hypericifolium* Ait., var. *cordigerum* (Greene) Bég. & Bel. Atti R. Accad. Lincei, V. ix. 114 (1913); Woodson, Ann. Mo. Bot. Gard. xvii. 141 (1930). *A. hypericifolium* Ait., var. *Farwellii* (Greene) Woodson, l. c. 140 (1930). ONTARIO: limestone pavement and gravel, Great Cloche Island, no. 3484.

Although Woodson treats var. *cordigerum* as a plant of the "upper Mississippi Valley," the representation in the Gray Herbarium shows it to be, likewise, in the drainage of the St. Lawrence and the Hudson to the east, and of the Saskatchewan to the northwest. Thoroughly characteristic specimens are before me from Indiana and Ohio, with a number from New York (south of Tripoli, Lake George region, July 5, 1914, Burnham; Newtown Pond, Junius, Wiegand, no. 3038; Westbury bog, Butler, A. H. Wright, no. 12,759). I am quite unable to see a distinct variety in *A. Farwellii*. Woodson treated it as a variety because it is "pubescent," but the specimens which I have seen (cited by him) have the hairs so few and so localized on the young growth that one must rake the specimens carefully with a lens to find them. In publishing *A. Farwellii* as a species Greene said: "main stem glabrous . . . up to the middle, above that, as also the branches, hirsutulous . . . leaves . . . all glabrous or nearly so above, sparsely fuscous-pubescent beneath." That was Greene's account of one individual, but there was another "in less pubescent, indeed almost glabrous state."

Woodson, quite misinterpreting the International Rules of Botanical Nomenclature, maintained the later name, *A. hypericifolium* Ait. Hort. Kew. i. 304 (1789), and rejected the clearly described and beautifully illustrated *A. sibiricum* Jacq. Hort. Vindob. iii. 37, t. 66 (1770). In apologizing for this irregular procedure he said:

Jacquin published *A. sibiricum* nineteen years previous to the publication of *A. hypericifolium* Ait. Moreover, the description of the former was accompanied by a full-page folio illustration of the habit of the plant. The Latin description of the former, also, was far more elucidating than the unillustrated and terse description of Aiton. However, as can be quickly perceived by a glance at the citations in literature on page 133, botanists were quick to take up *A. hypericifolium* Ait., while *A. sibiricum*



Jacq., perhaps because of the misleading geographical adjective, was disregarded for over a hundred years after its publication. In such a case, the practical course is to follow the so-called "Fifty year rule" tacitly established in the International Code of Nomenclature, and adopt the better-known designation.<sup>1</sup>

Although the motive, to reject an inappropriate name in favor of an appropriate one (as was done by many authors in the days before our existing rules of nomenclature) is commendable, it is certainly difficult to find anything in the International Rules or any other code about a "Fifty year rule" for species. The author doubtless had vaguely in mind the old "Berlin rule," which was the basis for the original list of *nomina generica conservanda*. No specific names are free from the priority principle.

Typical *Apocynum sibiricum* of Jacquin was the erect form, so illustrated and clearly described "Caules annui, erecti . . . sesquipedales." On the sands and gravels of much of Canada and the adjacent states it is quite prostrate, and erect plants are absent or difficult to find. This is

A. SIBIRICUM Jacq., forma **arenarium** (F. C. Gates), comb. nov. *A. hypericifolium*, prostrate, Schaffner, Ohio Nat. x. 184, fig. 1 (1910). *A. hypericifolium*, f. *arenarium* F. C. Gates, Torreya, xi. 128 (1911).

The western American *Apocynum sibiricum* is superficially like the typical plant, in having the middle leaves narrowly oblong to oblong-lanceolate, acute and with merely rounded to cordate bases (instead of oval or broadly ovate-oblong, rounded or obtuse or merely sub-acute and with cordate-clasping bases as in var. *cordigerum*), but this western extreme has more slender corolla-tube than typical *A. sibiricum* and the coma of the seed is longer. This is

A. SIBIRICUM Jacq., var. **salignum** (Greene), comb. nov. *A. salignum* Greene, Pittonia, v. 64 (1902). *A. hypericifolium*, var. *salignum* (Greene) Bég. & Bel. l. c. 115 (1913); Woodson, l. c. 141 (1930).

HACKELIA DEFLEXA (Willd.) Opiz, var. AMERICANA (Gray) Fern. & Johnst. RHODORA, xxvi. 124 (1924). MICHIGAN: borders of open woods north of Garden, Delta Co., and on shaded talus of limestone cliff, Burnt Bluff, Delta Co., nos. 3491, 3492.

Previously recorded, either as *Lappula americana* (Gray) Rydb. or *L. deflexa* (Willd.) Garcke from Cheboygan Co.

MERTENSIA PANICULATA (Ait.) G. Don, var. SUBCORDATA (Greene) Macbride. MICHIGAN: brookside in woods, south of L'Anse, Baraga Co., no. 3493.

<sup>1</sup> Woodson, *A Monograph of the Genus Apocynum*. Ann. Mo. Bot. Gard. xvii. 139 (1930).



In his *Studies in the Boraginaceae*, IX, Contrib. Arn. Arb. iii. 85 (1932), Johnston restricts var. *subcordata* to Washington, Oregon and Idaho. Our material, which he identifies without question as var. *subcordata*, adds another to the long series of identities in the floras of the Pacific slope and of the Upper Great Lakes.

**LITHOSPERMUM *croceum***, sp. nov. (TAB. 376, FIGS. 1-5). Perenne e radice longe et recte descendenti; caulibus 1.5-6 dm. altis pilosis; foliis subuniformibus lineari-oblongis vel lanceolatis obtusis vel subacutis adscendentibus plerumque 33-45 infra inflorescentiam, majoribus 2-5 cm. longis 3-15 mm. latis utrinque papilloso-hispidis pilis ca. 1 mm. longis; racemis floriferis dense corymbis 3-8 cm. diametro, racemis fructiferis elongatis 1-2 dm. longis strictis; bracteis late lanceolatis vel ovatis foliis similibus calices maturos valde superantibus fructiferis imbricatis; floribus breve pedicellatis; lobis calicis lanceolato-acuminatis valde carinatis papilloso-hispidis fructiferis 10-15 mm. longis; corollis croceis extus pilosis, tubo infundibuliformi exserto ad basin contracto poro minuto intus glabro basi barbato excepta, limbo 1.5-2 cm. diametro lobis oblongo-rotundatis opacis venis confluentibus; fauce vix vel breve appendiculato; staminibus inclusis, filamentis quam antherae oblongae brevioribus; nuculis albidis lucidis 3.5-4 mm. longis.—Sands, gravels and sandy woods, thickets and bluffs near the Great Lakes from western New York and Ontario westward, thence to Montana, South Dakota, Nebraska and Kansas. TYPE: calcareous sand back of beach of Lake Michigan, east of Manistique, Michigan, July 9, 1934. *Fernald & Pease*, no. 3494 (in Gray Herb.).

*Lithospermum croceum* is the plant of the sands of the Great Lakes region and of the plains westward and southwestward to Montana, South Dakota, Nebraska and Kansas which long passed as *L. hirtum* (Muhl.) Lehm., then as *L. Gmelini* (Michx.) Hitchc. and more recently as *L. caroliniense* (Walt.) MacMill. Those are all synonymous names and they go back for their typification to *Anonymos carolinensis* Walt. Fl. Carol. 91 (1788), a characteristic species of the coastal plain from South Carolina to Florida, thence to eastern Texas and adjacent Mexico, Arkansas and Oklahoma.

The southern coastal plain species is finely pilose, the hairs of stem and foliage (FIG. 6) much more abundant and less papillose-based than in the inland and more northern species, the lower cauline leaves very much smaller than the middle and upper, the latter well developed leaves only 15-25 below the branching inflorescence, with the midrib dorsally minutely pilose; the branches of the mature inflorescence are loosely ascending or spreading, with the bracts becoming distant; the mature calyx (FIG. 7) is slender-pedicelled, the pedicels ultimately



1/3–2/3 as long as the calyx, and the calyx-lobes are flat, with slender midrib and villous (instead of papillose)-hispid; the corolla is larger, paler, and of thinner texture, the limb 2–2.5 cm. broad, the throat with elongate appendages, the outside minutely appressed- or sericeous-pilose, the tube minutely pilose within, the veins (FIG. 8) continuing without evident anastomosing into the lobes. This southern species was first described as *Anonymos caroliniensis* Walt. Fl. Carol. 91 (1788). It was promptly renamed *Batschia caroliniensis* Gmel. Syst. i. 315 (1791) and, in the same year, *Lithospermum carolinianum* Lam. Tab. Encyc. i. 397 (1791). Somewhat later, with the probable desire to honor Gmelin for giving a generic identification to Walter's *Anonymos caroliniensis* and with complete disregard for the principle of priority which later became so important, it appeared as *Batschia Gmelini* Michx. Fl. Bor.-Am. i. 130 (1803). Yet again, regardless of the older and properly published names, Lehmann picked up a *nomen nudum* of Muhlenberg's—*Anchusa hirta* Muhl. Cat. 19 (1813)—and described *Lithospermum hirtum* Lehm. Asperif. ii. 304 (1818) from South Carolina, with the names of Walter, Gmelin and Michaux all cited as synonyms. As if this beautiful species of the southern coastal plain had not been sufficiently named, Rafinesque got it from Florida and described it as *L. strigosum* Raf. New Fl. N. Am. pt. iv. (Neobotanon), 18 (1836) and Alphonse DeCandolle, from a very inadequate Texan specimen, described it as *L. bejariense* A. DC. Prodr. x. 79 (1846). When two of the older names were transferred as *L. carolinense* (Walt.) MacMillan, Metasp. Minn. Val. 438 (1892) and as *L. Gmelini* (Michx.) Hitchc., Spring Fl. Manhattan, 30 (1894), their authors had before them local material of *L. croceum*. NOMENCLATURALLY, however, their combinations finally rest upon *Anonymos caroliniensis* Walter from South Carolina.

Yet the quite distinct northern and inland plant was regularly confused with the southern species and among the surplus of names proposed I can find none which designates it; nearly every one was content to rename the plant of South Carolina which Walter had originally described. In its very harsh pubescence *L. bejariense* A. DC. from eastern Texas, an isotype of which is before me, suggests *L. croceum*, but *L. bejariense* has the abruptly smaller lower leaves, the scattered fruiting bracts, the plane calyx-lobes and the characteristic venation of throat and lobes of the corolla of *L. carolinense*; and it is apparently a variation of the latter species, to which it was properly assigned by Johnston, Contr. Gray Herb. lxx. 31 (1924).



PLATE 376, FIG. 1 shows a small flowering plant,  $\times 1/2$  from the TYPE collection of *Lithospermum croceum*; FIG. 2, the top of a fruiting plant,  $\times 1/2$ , from Illinois; FIG. 3, a portion of the back of a bract,  $\times 10$ , of the type, to display characteristic pubescence; FIG. 4, a fruiting calyx,  $\times 3$ , to show the keel and the stiff ciliation of the calyxlobes; FIG. 5, the venation of the opaque corolla-lobe,  $\times 10$ , cleared for photographing by boiling in alcohol and then mounting in glycerine. The other figures, representing details of *L. caroliniense*, are noted in a preceding paragraph.

HEDEOMA HISPIDA Pursh. MICHIGAN: sand plain south of Iron Mountain, Dickinson Co., no. 3501.

Beal cites only a single station, near the southeastern corner of the state.

COLLINSIA PARVIFLORA Lindl. To the stations already recorded from the Keweenaw Peninsula add: wind-swept crests, crevices and talus of sandstone-conglomerate, West Bluff, Keweenaw Co., nos. 3512 (large, still flowering on July 4), 3513 (small, with capsules open).

MIMULUS MOSCHATUS Dougl. To the records from northern Michigan add: seepy bank in rich, deciduous woods, Delaware, Keweenaw Co., no. 3514.

Farwell had already collected *Mimulus moschatus* at Delaware in 1885 (his no. 277, from banks of brooks and moist places, "Indigenous to the Keweenaw Peninsula." He made a similar memorandum on his no. 5975 from streams near Lake Linden. In northern Michigan as elsewhere in the East, notably in Newfoundland and on the Magdalen Islands, the species seems to be indigenous.

VERONICA SCUTELLATA L., var. VILLOSA Schumacher. ONTARIO: by pool in argillaceous swale near Warren, Sudbury District, no. 3517.

In RHODORA, xxiii. 38 (1921) Pennell reduces the pubescent plant to formal rank, as forma *villosa* (Schumacher) Pennell, and states that it "occurs sporadically occasional throughout the range of the species." It may be so, but in nearly fifty years of intimate knowledge of *V. scutellata* in the area from Labrador and Newfoundland to western New York and Virginia, I had never seen the pubescent plant growing until I went to Lake Huron in the summer of 1934. In the very extensive collections of the Gray Herbarium and of the New England Botanical Club it is not represented from Labrador, Newfoundland, the Maritime Provinces, Quebec and New England, whence it should have been collected if present. All the material in the Gray Herbarium is from the Great Lakes area and the Puget



Sound area (western New York to Lake Superior; southwestern British Columbia, Vancouver Island and northwestern Washington). This range is so nearly identical with that of many other plants of the Great Lakes region that I am inclined to retain var. *villosa* as a geographic variety. When John Macoun described it as var. *pubescens* Macoun, Cat. i. 361 (1884) he knew it only from Belleville on Lake Ontario, saying: "It is the only form found there." This was the case, likewise, at the pool in Warren.

UTRICULARIA GEMINISCAPA Benj. (*U. clandestina* Nutt.). MICHIGAN: pools with *Potamogeton Oakesianus* Robbins, *Eleocharis Robbinsii* Oakes, *Eriocaulon septangulare* With., *Drosera intermedia* Hayne, etc. in bog near Rock River, Alger Co., no. 3521.

Perhaps the first record from Michigan; already known in Wisconsin.

PLANTAGO PURSHII R. & S. MICHIGAN: sandy open pine barrens north of Gladstone, Delta Co., no. 3524.

Apparently the first record from the Upper Peninsula. The plant seemed to be a part of the indigenous flora.

LONICERA VILLOSA (Michx.) R. & S., var. SOLONIS (Eaton) Fernald, RHODORA, xxvii. 6 (1925). MICHIGAN: arbor-vitae swamp near Eckerman, no. 3527.

When I studied the variations of *Lonicera villosa*, I had var. *Solonis* from Isle Royale but not from the mainland of Michigan.

VIRBURNUM AFFINE Bush. MICHIGAN: wind-swept crests, crevices and talus of sandstone-conglomerate, West Bluff, Keweenaw Co., no. 3537.

When Blake, RHODORA, xx. 14 (1918), divided *Virburnum affine*, he recognized the glabrous-leaved typical form from Ontario, Illinois, Minnesota, etc., but not from Michigan; the Michigan shrub recognized by him being var. *hypomalacum* Blake, l. c.

ASTER NEMORALIS Ait. MICHIGAN: larch swamp near Emerson, Chippewa Co., no. 3550.

Although Beal lists *Aster nemoralis* as "Common Th [roughout]," I find no other record of it from Michigan, nor has a specimen from so far west previously reached the Gray Herbarium.

ANTENNARIA RUPICOLA Fern. See RHODORA, xxxv. 342, 343, map 26, where no stations were indicated on the Great Lakes, except at the northwest side of Lake Superior. The following are more easterly. ONTARIO: limestone pavement and gravel, Great Cloche Island, Manitoulin District, no. 3556; dry soil, Jack Fish, Thunder Bay Distr., Pease & Bean, no. 23,475; roadside, Schreiber, Pease & Bean, no. 23,597.



ADENOCAULON BICOLOR Hook. To the comparatively few recorded stations about the Upper Great Lakes add: ONTARIO: Cape Croker, Indian Peninsula, Bruce Co., July, 1895, *A. Y. Massey* (Can. Nat. Herb.). MICHIGAN: deciduous woods between Rock River and Sand River, Alger Co., no. 3562; rich, deciduous woods (with *Polystichum Lonchitis*), Delaware, Keewenaw Co., no. 3563. See p. 210 and MAPS 8 and 9.

COREOPSIS LANCEOLATA L. ONTARIO: in great profusion and very showy on talus of hornblendic cliffs and ledges, Cloche Peninsula, Manitoulin Distr., no. 3564.

This station (very extensive) is recorded, since Macoun (Cat.) cited only vague and somewhat general areas, without definite localities.

C. LANCEOLATA, var. VILLOSA Michx. MICHIGAN: sandy barrens west of Norway, Dickinson Co., no. 3566.

Apparently not recorded from north of Illinois.

THE VARIETIES OF TANACETUM HURONENSE (PLATES 377 and 378).—The native tansy of eastern North America occurs in five widely segregated areas. The typical plant, described by Nuttall from "sandy shores of Lake Huron, near Michilimakinak; abundant," occurs on the sands and gravels of Lakes Huron, Superior and Michigan. Never properly represented in the Gray Herbarium, the Great Lakes plant has been considered inseparable from the plant of the St. John valley in Quebec, New Brunswick and Maine and the adjacent (and formerly confluent) valley of the Restigouche, a plant abundantly represented in the Gray Herbarium and the herbarium of the New England Botanical Club. Our collection of the typical Great Lakes plant is now, happily, augmented and it is clear that the isolated plant of the St. John and Restigouche valleys is a strongly marked geographic variety. Farther east, on the river-gravels of Anticosti, the plant combines the characters of the typical Great Lakes variety and that of the St. John and the Restigouche, while the plant from dunes of James Bay and eastern Hudson Bay seems to be that of Anticosti. Farthest east, the usually monocephalous and densely lanate plant of the west coast of Newfoundland, var. *terrae-novae*, exhibits the most extreme departure from the type of the species.

The characters of these four geographic varieties of *Tanacetum huronense* are briefly stated below and the plates bring out the essential differences.

- a. Flowering stem 4–8 dm. high, with 7–15 green leaves: corymb with 6–30 heads: leaves oblong, with oblong to oblanceolate pinnae. . . . . Var. *typicum*.
- a. Flowering stem 0.4–4.5 dm. high: corymb with 1–6 heads. . . . b.
- b. Leaves oblong to narrowly elliptic, the larger 4–10 cm. long, 2–5 cm. broad; the pinnae oblong to oblong-oblanceolate, blunt, with approximate to imbricated pinnules. . . . c.



- c. Flowering stems 1.2–3 dm. high, glabrous to sparingly pilose (except at summit), with 4–10 green and sparsely pilose leaves above the basal rosette: heads 2–6. . . . . Var. *bifarium*.
- c. Flowering stem 0.4–2 dm. high, copiously lanate, with 1–4 white-lanate leaves above the basal rosette: heads 1 or 2 (rarely –4). . . . . Var. *terrae-novae*.
- b. Leaves (especially the basal and median) elliptic, the larger 1–3 dm. long, 0.35–1.4 dm. broad; pinnae remote, with remote simple to much dissected acute pinnules: flowering stems 2–4.5 dm. high, with 5–10 leaves and 1–5 heads. Var. *johannense*.

*T. HURONENSE* Nutt., var. **typicum** (PLATE 377, FIGS. 1 and 2). *T. huronense* Nutt. Gen. No. Am. Pl. ii. 141 (1818).—Sands and gravels of Lakes Huron, Michigan and Superior.

Var. **bifarium**, var. nov. (TAB. 377, FIGS. 3 et 4), var. *typico* similima a qua differt caulibus 1.2–3 dm. altis glabris vel sparse pilosis; foliis caulinis 4–10 sparse pilosis oblongis vel anguste ellipticis majoribus 6–10 cm. longis 2–5 cm. latis, pinnis oblanceolatis obtusis, pinnulis obtusis; capitulis 2–6.—Anticosti Island, QUEBEC: sur les platîères de l'embouchure, Rivière Jupiter, 10 août 1926, *Victorin & Rolland*, no. 25,177; sur les platîères au-dessus des gorges, Rivière Chicotte, 15 août 1926, *Victorin & Rolland*, no. 25,176; sur les platîères, R. des Caps, 25 juillet 1927, *Victorin & Rolland*, no. 27,566; sur les platîères argilo-calcaires, avec *Solidago Victorinii*, R. McKane, 30 juillet 1927, *Victorin & Rolland*, no. 27,564 (TYPE in Gray Herb.). UNGAVA DISTR.: east coast of Hudson Bay, Smith Sound, August 24, 1928, *Malte*, no. 120,894; sandy shore of Hudson Bay, Port Harrison, August 18–20, 1928, *Malte*, no. 120,720; sand dunes near the Post, Charlton Island, July 6, 1929, *David Potter*, no. 25.

Var. **TERRAE-NOVAE** Fernald, RHODORA, xxv. 14 (1923). PLATE 378, FIGS. 1–4. Peaty turfy or gravelly limestone barrens of western Newfoundland, in typical development from the shore of Pistolet Bay to Ingornachoix Bay; the plant of Cape St. George approaching var. *bifarium*.

Var. **johannense**, var. nov. (TAB. 378, FIGS. 5 et 6), foliis imis mediisque late ellipticis majoribus 1–3 dm. longis 0.35–1.4 dm. latis, pinnis remotis, pinnulis remotis acutis simplicibus vel valde dissectis; caulibus 2–4.5 dm. altis; foliis caulinis 5–10; capitulis 1–5.—Gravels and sands of the St. John River and tributaries, Quebec, Maine and New Brunswick, and of the Restigouche River, New Brunswick and Quebec. TYPE: river-gravels and shingly border of thicket by the St. John River, Woodstock, New Brunswick, July 14, 1916, *Fernald & Long*, no. 14,860 (TYPE—four sheets—in Gray Herb.).

**ARNICA (CORDIFOLIAE) Whitneyi**, sp. nov. (TAB. 379, FIGS. 1–5), rhizomate gracili perlongo horizontali vel subadscendente stolonifero; caule solitario 1.7–4 dm. alto sparse villosa, pilis albidis ad 2 mm. longis glandulis minutis commixtis; foliis basilaribus late ovatis vel subrotundatis membranaceis utrinque sparse pilosis 5.5–10 cm. longis 4.5–8 cm. latis, basi valde cordatis sino angusto, margine remote



breviterque serrato-dentato, apice subacuto vel rotundato, petiolo gracile 6–12 cm. longo glanduloso-villoso; foliis caulinis 2–3-jugis, imis longe petiolatis basilares simulantibus, mediis similibus breviter petiolatis basi cordatis vel subcordatis, superioribus reductis ovatis vel lanceolatis subintegris acutis basi rotundatis sessilibus vel breve petiolatis; pedunculis 1–3 nudis vel bracteatis, bracteis lineari-lanceolatis caudato-attenuatis; capitulis 2.5–5 cm. diametro; involucri 1.2–1.8 cm. alto basi dense albido-villoso supra glanduloso laxaque villosa; bracteis 8–12 lineari-oblongatis 2–3 mm. latis apice deltoideo-acuminatis; ligulis luteis, lamina 1.2–1.8 cm. longa 4–6 mm. lata 7–9-nervata apice breviter 3-dentata dentibus vix 1 mm. longis; corollis disci 8 mm. longis, tubo villosa 3–4 mm. longo basi obcupuliformi, cupula glabra 0.6–0.7 mm. alta; achaeniis nigris 7 mm. longis strigoso-hirsutis basi anguste albido-annulatis, annulo 0.1 mm. lato; pappo albido 8–11 mm. longo, setis barbellulatis.—Keweenaw County. MICHIGAN: Copper Harbor, 1849, *W. D. Whitney* in Gray Herb.; dry deciduous woods near Copper Harbor, July 4, 1934, *Fernald & Pease*, no. 3579 (TYPE in Gray Herb.); dry, deciduous woods at base of greenstone and calcareous conglomerate bluffs, east of Eagle Harbor, July 6, 1934, *Fernald & Pease*, no. 3580.

*Arnica Whitneyi*, as beautiful a plant as any in the genus, is named for its discoverer, WILLIAM DWIGHT WHITNEY, 1827–1894. In his report on Botany in Foster, J. W., and Whitney, J. D., Rep. Geol. Lake Superior Land District, ii. Chap. xxi, 368 (1851), W. D. Whitney recorded it as *A. mollis* Hook. from Copper Harbor; and his material (the upper half of a plant preserved in the Gray Herbarium) has been the basis of subsequent reports of *Arnica* from Michigan: as *A. Chamissonis* of Gray, Man. ed. 2, issue of 1859, and later eds., from Lake Superior, and of Beal & Wheeler's Michigan Flora; as *A. lanceolata* of Britton, Man. and of Beal, Flora of Michigan; as *A. cordifolia* of Fernald, RHODORA, vii. 150, from Copper Harbor (*Whitney*) and of Robinson & Fernald in Gray, Man. ed. 7; as *A. mollis* of Britton in Britton & Brown, Ill. Fl. ed. 2, from Lake Superior.

The white, merely barbellulate pappus of the fragmentary Whitney specimen clearly separates his plant from *Arnica Chamissonis* Less. and *A. mollis* Hook. (including *A. lanceolata* Nutt.) which have brownish or olivaceous plumose pappus. The beautiful new material, with characteristic basal leaves, shows that the relationship of *A. Whitneyi* is with *A. cordifolia* Hook. and its cordilleran segregates. The Keweenaw plant, however, seems very distinct from *A. cordifolia* and its described allies.

In typical *A. cordifolia* (FIGS. 6–9), as shown by an authentic specimen sent by Hooker in 1835 to Jacques Gay and now preserved



in the Gray Herbarium (Hooker had published the species in 1834) and by a large series of specimens from the cordilleran region, the basal leaves are merely cordate, subcordate or subtruncate at base, with broad and open sinuses, and the marginal teeth are very coarse; the middle and upper cauline leaves are mostly deltoid-ovate, the upper sometimes rhombic, and with prolonged tips; and the pubescence of the stem, peduncles and involucre rarely shows much of the glandular admixture which is so abundant on and which gives a heavy, oily odor to *A. Whitneyi*. In *A. cordifolia* the involucral bracts (FIG. 6) are usually more broadly oblanceolate than in *A. Whitneyi* (FIG. 2) and without the abundant glands on the surface; the ligules (FIG. 7) are broader (up to 1 cm. broad), with sharper and longer terminal lobes (the longer 1.5–3 mm. long); the disk-corollas (FIG. 8) are coarser (9–11 mm. long), the tube with a conical, rather than inverted-cuplike base; and the slightly coarser achenes (FIG. 9) have the basal annulus heavier and thicker.

These numerous characters, though largely of degree, set the Keweenaw plant off so definitely from its cordilleran allies that it seems better to treat it as a species than as an isolated variety which differs in ten or more recognizable characters. Its nearest relationship is certainly with *Arnica cordifolia*; the other recognized members of the *Cordifoliae* (all cordilleran) are more remote from it. In Keweenaw County *A. Whitneyi* was closely associated with the ubiquitous *Aster macrophyllus* L. Where the *Arnica* made large patches of sterile shoots with their characteristic foliage, it was necessary to exercise caution not to collect rosettes of the *Aster*!

In view of the discovery of *Arnica Whitneyi* in 1849 by the young botanist who then was dividing his interest between natural history and philology, later to become one of our most distinguished philologists,<sup>1</sup> it is most appropriate that the rediscovery of this beautiful

<sup>1</sup> In 1849, WILLIAM DWIGHT WHITNEY went as botanist on the Lake Superior expedition of his older brother, Josiah Dwight Whitney. "Up to this time, as has already been intimated, his interests lay mainly in the direction of the natural sciences. But an event was now about to occur which was destined to change the course of his studies and to determine his whole future. In 1847, his elder brother, Professor J. D. Whitney, had returned from Germany, where he had been devoting himself to the science [geology] in which he has become distinguished. Yet while there he had not limited his attention to it, but had given up a good deal of time to language. Among the books he brought back with him was a copy of the second edition of Bopp's Sanscrit Grammar. This work attracted the attention of his younger brother, and aroused a keener interest than he had before felt in any particular subject. In the winter of the following year he began the systematic study of Sanscrit. For him this was the parting of the ways. In June, 1849, indeed, he joined an expedition sent out by the United States government to explore the region about Lake Superior. One of its two directors was his elder brother, and to the future philologist were assigned



plant should have been shared by a later distinguished philologist, Arthur Stanley Pease, who finds his chief diversion in botany.

*CIRSIIUM PALUSTRE* (L.) Scop. MICHIGAN: border of wet woods, Lawson, Marquette Co., no. 3582; low woods, Michigamme, no. 3583; and seen in similar habitats to Houghton Co.

*Cirsium palustre* in northern Michigan is either indigenous (as it appears to be in Newfoundland)<sup>1</sup> or, if introduced, has remarkably succeeded in selecting habitats where it simulates indigenous species. Its behavior in Michigan (whether it suddenly spreads or remains quiescent) should be watched.

*KRIGIA BIFLORA* (Walt.) Blake, forma **glandulifera**, f. nov., pedunculis superne glanduliferis.—With or apart from the typical glabrous-peduncled form of the species. TYPE: dry sandy spruce and pine barrens near Humboldt, Michigan, July 3, 1934, *Fernald & Pease*, no. 3584, in Gray Herb.

Typical *Krigia biflora* (Walt.) Blake, *RHODORA*, xvii. 135 (1915), has glabrous peduncles. So far as shown in the Gray Herbarium all the specimens from New England to West Virginia are without glands. Some from Kentucky, North Carolina and Tennessee have glandular peduncles; others, often of the identical collection (on the same sheet) are glandless. In the Great Lakes region, thence westward to Colorado, glandular peduncles occur on about one-third of the specimens in the herbarium. Here, again, glabrous and glandular peduncles are sometimes on the same sheet. All the material we saw in northern Michigan had the glands well developed. I cannot, however, look upon these plants as more than a recognizable form. They surely are not a separate species. Upon the collection of Bronson Barlow from Turin, Marquette Co., Michigan, June 21, 1901, was based *Cynthia falcata* Standley, Contrib. U. S. Nat. Herb. xiii. 356 (1911). One of the Barlow sheets is before me and I cannot separate it from much typical *Krigia biflora* except in glandular peduncles. Standley, in publishing *Cynthia falcata*, separated it solely on the "prominently aquiline-serrate upper leaves," the upper leaves of *Cynthia virginica*

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the barometrical observations, the botany, and the charge of the accounts. But he took with him also his copy of Bopp, and the leisure moments he enjoyed during the expedition were, as far as possible, devoted to the fuller study of that work."—T. R. Lounsbury, *William Dwight Whitney*, Proc. Am. Acad. xxx. 580, 581 (1895).

In view of the frequent assumptions that W. D. Whitney, botanist of the Lake Superior expedition of 1849, was really J. D. Whitney, the distinguished geologist (the "W" being considered a misprint), and since the botanical report is entered in bibliographies merely under W. D. Whitney, the above excerpt from Professor Lounsbury's sketch is quoted as satisfactorily clearing the identity.

<sup>1</sup> See Fernald, *RHODORA*, xxxv. 15 and 369 (1933).



(*Krigia biflora*) said to be entire. In his proposed new species the "fruit is as in *C. virginica* . . . A very different plant . . . , readily distinguished by the peculiar toothedness of its leaves."

In the Barlow sheet in the Gray Herbarium the uppermost leaves (bracts) are entire, but the median and lower leaves have prominent divergent to curving variable teeth. Such teeth are seen on our collection from Gladstone, Michigan (*F. & P.*, no. 3585) which, accordingly, would be *Cynthia falcata*. They occur on numerous other specimens with glandular peduncles and upon many with the peduncles glabrous: from Southbury, Connecticut; Mohegan, New York; Mount Bethel, Pennsylvania; Webster Co., West Virginia; Milwaukee, Wisconsin; Rantoul, Illinois, etc. The character depended upon by Standley as his fundamental specific one is too fickle. The plants with strongly developed glands are at least recognizable and may have some ecological significance. To take up Standley's specific epithet *falcata* to designate a *glandular* form would be quite misleading and is wholly unnecessary. Similarly, to take up for a glandular form of nearly transcontinental range the name *C. viridis* Standley, l. c. 357 (1911), given to the plants of New Mexico and Arizona (occurring also in Colorado) because of a reputed greener color, would be inappropriate. Consequently, I have given a new name and have designated a different type.

#### EXPLANATION OF PLATES 352-380

PLATES 352-354. Sufficiently explained in the legends.

PLATE 355. *PHYLLITIS SCOLOPENDRIUM* (L.) Newm.: FIG. 1, frond,  $\times \frac{1}{2}$ , from Larmor's Glen, Dundonald, Ireland, August 12, 1884, *R. L. Praeger*; FIG. 3, portion of stipe,  $\times 10$ , from Ennis, Co. Clare, Ireland, *Tidestrom*, no. 11,256; FIG. 5, margin of frond,  $\times 10$ , from Savoy, ex herb. Thurber.

*P. SCOLOPENDRIUM* var. *AMERICANA*, n. var.: FIG. 2, frond,  $\times \frac{1}{2}$ , from Perryville, Madison Co., New York, August, 1903, *House*; FIG. 4, portion of stipe,  $\times 10$ , from Ingalls Falls, Grey Co., Ontario, *Fernald*, no. 3040 (TYPE); FIG. 6, margin of frond,  $\times 10$ , from White Lake, east of Jamesville, New York, *Wiegand*, no. 5374.

PLATE 356. *CRYPTOGRAMMA CRISPA* (L.) R. Br., var. *ACROSTICHOIDES* (R. Br.) C. B. Clarke: reproduction of original plate of *C. acrostichoides* in Hooker & Greville, *Icones Filicum*, i. t. xxix.

PLATE 357. *CRYPTOGRAMMA CRISPA*, var. *BRUNONIANA* (Wallich) Fern.: reproduction of original plate of *C. Brunoniana* in Hooker & Greville, *Icones Filicum*, ii. t. clviii.

PLATE 358. *PTERIDIUM AQUILINUM* (L.) Kuhn, var. *LANUGINOSUM* (Bong.) Fern., forma *DECIPIENS* (Lawson) Fern.: portion of plant,  $\times \frac{3}{5}$ , from Caribou Hill, Black Lake, Megantic Co., Quebec, *Fernald & Jackson*, no. 11,961.

PLATE 359. *FESTUCA OVINA* L.: FIG. 1, panicle,  $\times 1$ , from Glåmos, Norway, 1925, *Dyring*; FIG. 2, spikelet, showing anthers,  $\times 5$ , from Forked River, New Jersey, May 27, 1891, *J. R. Churchill*.

*F. OVINA*, var. *DURIUSCULA* (L.) Koch: FIG. 3, panicle,  $\times 1$ , from Cambridge,



Massachusetts, June 8, 1884, *Walter Deane*; FIG. 4, spikelet, showing anthers,  $\times 5$ , from Albany, New York, June 6, 1912, *S. H. Burnham*.

*F. SAXIMONTANA* Rydb.: FIG. 5, panicle,  $\times 1$ , from Jack Fish, Thunder Bay Distr., Ontario, *Pease & Bean*, no. 23,332; FIG. 6, spikelet, showing anthers,  $\times 5$ , from no. 23,332.

*F. BRACHYPHYLLA* Schultes: FIG. 7, panicle,  $\times 1$ , from Craig Harbor, Ellesmere Island, *Malte*, no. 118,370; FIG. 8, spikelet, showing small anther,  $\times 5$ , from Craig Harbor, Ellesmere Island, *Malte*, no. 118,372.

*F. SUPINA* Schur: FIG. 9, spikelet, showing anthers,  $\times 5$ , from Petrak, Fl. Bohem. et Morav. Exsicc. no. 717.

*F. VIVIPARA* (L.) Sm.: FIG. 10, panicle,  $\times 1$ , from Little Quirpon, Newfoundland, *Wiegand, Gilbert & Hotchkiss*, no. 27,385; FIG. 11, spikelet, showing awnless lemmas,  $\times 5$ , from no. 27,385.

*F. CAPILLATA* DC.: FIG. 12, panicle,  $\times 1$ , from Grand Falls, Newfoundland, *Fernald & Wiegand*, no. 4669; FIG. 13, spikelet, showing anthers,  $\times 5$ , from Murray's Pond, Newfoundland, 1931, *A. M. Ayre*.

PLATE 360. *CAREX GARBERI*, n. sp.: FIG. 1, small plant,  $\times 1$ , from Manistique, Michigan, *Fernald & Pease*, no. 3183; FIG. 2, orifice of sheath,  $\times 5$ , from no. 3183; FIG. 3, spike, showing obtuse scales,  $\times 5$ , from no. 3183; FIG. 4, staminate base of terminal spike, showing obtuse scales,  $\times 5$ , from Presque Isle, Pennsylvania, June 9, 1869, *Garber* (ISOTYPE); FIG. 5, denuded rachis,  $\times 10$ , from *Fernald & Pease*, no. 3183; FIG. 6, perigynium,  $\times 10$ , from ISOTYPE.

*C. GARBERI*, var. *BIFARIA*, n. var.: FIG. 11, portion of plant,  $\times 1$ , from River Ste. Anne des Monts, Quebec, August 3–17, 1905, *Collins & Fernald* (TYPE); FIG. 12, perigynium,  $\times 10$ , from TYPE.

*C. HASSEI* Bailey: FIG. 7, portion of spike, showing sharp scales,  $\times 5$ , from San Bernardino, California, *S. B. Parish*, no. 5219; FIG. 8, staminate base of terminal spike, showing large, acute scales,  $\times 5$ , from no. 5219; FIG. 9, orifice of sheath,  $\times 5$ , from no. 5219.

*C. AUREA* Nutt.: FIG. 10, portion of spike, to show distant flowers,  $\times 5$ , from Charlotte, Vermont, June 12, 1878, *F. H. Horsford*.

PLATE 361. *ZIGADENUS GLAUCUS* Nutt.: FIG. 1, flowering plant,  $\times \frac{2}{5}$ , from Scotty Bay, Mackinac Co., Michigan, *Ehlers*, no. 648; FIG. 2, portion of inflorescence, showing firm bracts,  $\times 2$ , from L'Anse Pleureuse, Gaspé Co., Quebec, *Kelsey & Jordan*, no. 55; FIG. 3, capsule,  $\times 2$ , from Cap Blanc, Percé, Quebec, *Collins, Fernald & Pease* (*Pease*, no. 5567).

*Z. ELEGANS* Pursh: FIG. 4, flowering plant,  $\times \frac{2}{5}$ , from mountains (at 10,500 ft.) near Cottonwood Lake, Lincoln Co., Wyoming, *Payson & Armstrong*, no. 3774; FIG. 5, portion of inflorescence, showing scarious bracts,  $\times 2$ , from Leeds, North Dakota, July 3, 1899, *Lunell*; FIG. 6, capsule,  $\times 2$ , from French Creek, Albany Co., Wyoming, *Goodding*, no. 2036.

PLATE 362. *RIBES CYNOSBATI* L.: FIG. 2, fruiting branch,  $\times 1$ , from Stowe, Vermont, July 8, 1908, *R. W. Woodward*.

*R. CYNOSBATI*, var. *ATROX*, n. var.: FIG. 1, fruiting branch,  $\times 1$ , from Little Current, Manitoulin Island, Ontario, *Fernald & Pease*, no. 3358 (TYPE).

PLATE 363. *RUBUS PARVIFLORUS* Nutt.,  $\times 1/10$ , in border of mixed woods, Bête Grise, Keweenaw Co., Michigan.

PLATE 364. *RUBUS PARVIFLORUS* Nutt., var. *GENUINUS*: FIG. 1, young calyx,  $\times 10$ , and FIG. 2, portion of mature sepal,  $\times 10$ , showing the long villosity hiding the glands, from Mackinac Island (type-locality), Michigan, July 1881, *T. E. Boyce*.

Var. *VELUTINUS* (Hook. & Arn.) Greene: FIG. 3, peduncle,  $\times 10$ , from California, *Ross*, and FIG. 4, lower surface of young leaf,  $\times 10$ , to show the dense villosity, from California, *Thos. Coulter*, no. 147.

Var. *HYPOMALACUS*, n. var.: FIG. 5, lower surface of leaf,  $\times 10$ , showing characteristic pubescence, from Olympic Mts., Washington, *J. M. Grant*, no. 211 (TYPE). NOTE: The pubescence of var. *bifarius* is similar.

Var. *HETERADENIUS*, n. var.: FIG. 6, portion of pedicel and calyx,  $\times 10$ , showing the long glands, from near Victoria, British Columbia, June, 1896, *C. E. Cummings*. NOTE: The pedicel and calyx of var. *hypomalacus* are



similar. FIG. 7, lower surface of leaf,  $\times 10$ , from Falcon Valley, Washington, *Suksdorf*, no. 1758 (TYPE). NOTE: The lower surfaces in vars. *grandiflorus* and *scopulorum* are similar.

PLATE 365. *RUBUS PARVIFLORUS* Nutt., var. *GRANDIFLORUS* Farwell: FIG. 4, portion of pedicel and calyx,  $\times 10$ , showing glandularity intermediate between that of vars. *heteradenius* and *scopulorum*, from Lead City, South Dakota, *Rydberg*, no. 655. NOTE: The pedicels and calyx of var. *bifarius* are similar.

Var. *SCOPULORUM* (Greene) Fern.: FIG. 5, pedicel,  $\times 10$ , showing the very abbreviated glands, from La Plata Cañon, Colorado, *Baker, Earle & Tracy*, no. 680.

Var. *PARVIFOLIUS* (Gray) Fern.: FIG. 1, two plants,  $\times \frac{2}{5}$ , from Pecos River National Park, New Mexico, *Standley*, no. 4032; FIG. 2, calyx and summit of pedicel,  $\times 10$ , showing essential lack of glands, from Santa Fé Creek, New Mexico, *Fendler*, no. 208 (TYPE); FIG. 3, lower surface of leaf,  $\times 10$ , showing reduction of pubescence, from the TYPE.

PLATE 366. *CHAMAERHODOS NUTTALLII* Pickering, var. *KEWEENAWENSIS*, n. var.: FIG. 1, plant,  $\times 1$ , of TYPE-collection, West Bluff, Keweenaw Co., Michigan, *Fernald & Pease*, no. 3376; FIG. 2, branch,  $\times 10$ , showing pubescence, from TYPE.

*C. NUTTALLII*: FIG. 3, branch,  $\times 10$ , to show pubescence, from type-locality, Mandan, North Dakota, June 23, 1912, *O. A. Stevens*.

PLATE 367. *POTENTILLA FRUTICOSA* L., forma *VILLOSISSIMA*, n. f.: FIG. 1, fruiting branch,  $\times 1$ ; FIG. 2, leafy branch,  $\times 1$ ; FIG. 3, branchlet,  $\times 3$ ; all from Great Cloche Island, Ontario, *Fernald & Pease*, no. 3382 (TYPE).

PLATE 368. *GEUM VIRGINIANUM* L.: TYPE (plant of *Hortus Upsaliensis* in Herb. Linnaeus). Photograph from Mr. S. SAVAGE, Assistant Secretary, Linnean Society of London.

PLATE 369. *GEUM ALEPPICUM* Jacq.: reproduction from Jacquin, Ic. Pl. Rar. i. t. 93.

PLATE 370. *GEUM ALEPPICUM* Jacq.: FIG. 2, portion of fruiting head, showing villous achenes,  $\times 4$ , from Nízské, Tatry Mts., Slovakia, *Domin & Krajina*, Fl. Cechoslov. Exsicc., no. 272; FIG. 3, achene,  $\times 10$ , from Lyck, East Prussia, July 1, 1858, *C. Sania*.

*G. ALEPPICUM*, var. *STRICTUM* (Ait.) Fern.: FIG. 1, small fruiting plant, showing variation of basal leaves,  $\times \frac{2}{5}$ , from Willoughby, Vermont, July 18, 1896, *E. F. Williams*; FIG. 4, portion of fruiting head, showing sparsely pubescent achenes,  $\times 4$ , from Kidstone Island, Nova Scotia, *Fernald & Long*, no. 21,521; FIG. 5, achene,  $\times 10$ , from Richmond, New Hampshire, September 8, 1926, *C. F. Batchelder*.

PLATE 371. *GERANIUM DISSECTUM* L.: FIG. 1, calyx,  $\times 5$ , of *G. laxum* Hanks, from Friday Harbor, San Juan Islands, Washington, *Zeller*, no. 834; FIG. 2, carpel-body,  $\times 5$ , from Biltmore, North Carolina, *Biltmore Herb.*, no. 4868; FIG. 3, seed,  $\times 10$ , from Tyrone, Ireland, 1896, *Leebody*; FIG. 4, seed,  $\times 10$ , of *G. laxum* Hanks, from near Milwaukie, Oregon, *Suksdorf*, no. 2450; FIG. 5, seed,  $\times 10$ , from *Biltmore Herb.*, no. 4868; FIG. 6, surface of seed,  $\times 50$ , from Tyrone, Ireland, *Leebody*; FIG. 7, surface of seed,  $\times 50$ , of *G. laxum* Hanks, from *Suksdorf*, no. 2450.

*G. BICKNELLII* Britton: FIG. 8, calyx,  $\times 5$ , from Bathurst, New Brunswick, July 25, 1902, *Williams & Fernald*; FIG. 9, seed,  $\times 10$ , from West Roxbury, Massachusetts, *Floyd*, no. 1041; FIG. 10, seed,  $\times 10$ , from Sorrento, Maine, July 27, 1889, *G. G. Kennedy*; FIG. 11, surface of seed,  $\times 50$ , from Sorrento.

*G. BICKNELLII*, var. *LONGIPES* (Wats.) Fern.: FIG. 12, calyx,  $\times 5$ , from Seely Lake, Montana, *Kirkwood*, no. 1836; FIG. 13, peduncle and pedicel,  $\times 10$ , from TYPE, Washatch Mts., Utah, *Watson*, no. 206; FIG. 14, peduncle and pedicel,  $\times 10$ , from isotype of *G. nemorale* *Suksdorf*, West Klickitat Co., Washington, *Suksdorf*, no. 2058; FIG. 15, carpel-body,  $\times 5$ , from Ione, Washington, *Kreager*, no. 406; FIG. 16, seed,  $\times 10$ , from Washington, *G. R. Vasey*, no. 217; FIG. 17, seed,  $\times 10$ , from Blue Mts., Walla Walla Co., Washington, August 2, 1896, *Piper*; FIG. 18, surface of seed,  $\times 50$ , from last specimen.



PLATE 372. *GERANIUM SPHAEROSPERMUM*, n. sp.: FIG. 1, portion of fruiting plant,  $\times 1$ , from TYPE, Great Cloche Island, Ontario, *Fernald & Pease*, no. 3405; FIG. 2, calyx,  $\times 5$ , from TYPE; FIG. 3, carpel-body,  $\times 10$ , from TYPE; FIG. 4, seed,  $\times 10$ , from TYPE; FIG. 5, surface of seed,  $\times 50$ , from TYPE.

*G. TEXANUM* (Trel.) Heller; FIG. 6, calyx,  $\times 5$ , from TYPE, New Braunfels, Texas, *Lindheimer*; FIG. 7, carpel-body,  $\times 10$ , from Corpus Christi, Texas, *Tracy*, no. 9215; FIG. 8, seed,  $\times 10$ , from no. 9215; FIG. 9, seed,  $\times 10$ , from TYPE; FIG. 10, surface of seed,  $\times 50$ , from TYPE.

PLATE 373. *GERANIUM CAROLINIANUM* L.: Copied (reduced) from *Dillenius*, Hort. Elth. t. 135.

PLATE 374. *GERANIUM CAROLINIANUM* L., var. *CONFERTIFLORUM*, n. var.: FIG. 1, portion of fruiting plant,  $\times 1$ , from TYPE, North Amherst, Ohio, *R. J. Webb*, no. 5263; FIG. 6, calyx,  $\times 5$ , from Alexandria, Virginia, *Wiegand & Manning*, no. 1692; FIG. 2, carpel-body,  $\times 10$ , from Warwick, Rhode Island, June 25, 1910, *Fernald*; FIG. 3, seed,  $\times 10$ , from TYPE; FIG. 4, seed,  $\times 10$ , from New Bedford, Massachusetts, *E. W. Hervey*; FIG. 5, surface of seed,  $\times 50$ , from TYPE.

*G. CAROLINIANUM* L.: FIG. 7, seed,  $\times 10$ , of *G. Langloisii* Greene, from Gretna, Louisiana, *Ball*, no. 301; FIG. 8, surface of seed,  $\times 50$ , from no. 301.

PLATE 375. *VIOLA SEPTENTRIONALIS*, var. *GRISEA*, n. var.: FIG. 1, fruiting plant,  $\times 1$ , from Driggs, Michigan, *Fernald & Pease*, no. 3430 (TYPE); FIG. 2, base of expanding leaf,  $\times 10$ , from TYPE; FIG. 3, cleistogamous fruit, to show ciliate auricles of sepals,  $\times 10$ , from TYPE.

PLATE 376. *LITHOSPERMUM CROCEUM*, n. sp.: FIG. 1, small flowering plant,  $\times \frac{1}{2}$ , from east of Manistique, Michigan, *Fernald & Pease*, no. 3494 (TYPE); FIG. 2, fruiting stem,  $\times \frac{1}{2}$ , from Topeka, Illinois, August 22, 1904, *Gleason*; FIG. 3, back of bract, showing characteristic pubescence,  $\times 10$ , from Pelee Island, Ontario, August 20, 1914, *MacDaniels & Eames*; FIG. 4, fruiting calyx, showing prominent costa,  $\times 4$ , from Southampton, Ontario, *Macoun*, no. 54,342; FIG. 5, portion from summit of tube and base of corolla-lobe, to show characteristic reticulate venation,  $\times 10$ , from TYPE.

*L. CAROLINIENSE* (Walt.) MacM.: FIG. 6, back of bract, showing characteristic pubescence,  $\times 10$ , from Columbia, South Carolina, *Canby*, no. 75; FIG. 7, fruiting calyx, showing flat sepals,  $\times 4$ , from near Antlers, Pushmatah Co., Oklahoma, *E. J. Palmer*, no. 39,403; FIG. 8, portion from summit of tube and base of corolla-lobe to show characteristic non-reticulate venation,  $\times 10$ , from *Canby*, no. 75.

PLATE 377. *TANACETUM HURONENSE* Nutt., var. *TYPICUM*: FIG. 1, flowering stem and basal leaf,  $\times \frac{2}{5}$ , from Manistique, Michigan, *Fernald & Pease*, no. 3567; FIG. 2, achene,  $\times 10$ , from Lake Superior, *Loring*.

Var. *BIFARIUM*, n. var.: FIG. 3, flowering plant,  $\times \frac{2}{5}$ , from Rivière McKane, Ile d'Anticosti, Quebec, *Victorin & Rolland*, no. 27,564 (TYPE); FIG. 4, basal leaves,  $\times \frac{2}{5}$ , from Rivière des Caps, Anticosti, *Victorin & Rolland*, no. 27,566.

PLATE 378. *TANACETUM HURONENSE* Nutt., var. *TERRAE-NOVAE* Fern.: FIGS. 1-3, flowering plants,  $\times \frac{2}{5}$ , from St. John Island, Newfoundland, *Fernald et al.*, no. 29,201; FIG. 4, achene,  $\times 10$ , from Sandy Cove, Ingornachioix Bay, Newfoundland, *Fernald, Long & Dunbar*, no. 27,157.

Var. *JOHANNENSE*, n. var.: FIG. 5, flowering branch,  $\times \frac{2}{5}$ , from St. John River, Westfield, New Brunswick, *Fernald*, no. 2262; FIG. 6, achene,  $\times 10$ , from St. John River, Woodstock, New Brunswick, *Fernald & Long*, no. 14,860.

PLATE 379. *ARNICA WHITNEYI*, n. sp.: FIG. 1, small flowering plant and basal rosette,  $\times \frac{2}{5}$ , from Copper Harbor, Michigan, *Fernald & Pease*, no. 3579 (TYPE); FIG. 2, portion of involucre,  $\times 2$ , from Eagle Harbor, Michigan, no. 3580; FIG. 3, tip of ligule,  $\times 2$ , from TYPE; FIG. 4, disk-corolla,  $\times 5$ , from TYPE; FIG. 5, achene,  $\times 5$ , from TYPE.

*A. CORDIFOLIA* Hook.: FIG. 6, portion of involucre,  $\times 2$ , from Carson, Colorado, *C. F. Baker*, no. 312; FIG. 7, tip of ligule,  $\times 2$ , from Druid Peak, Yellowstone National Park, *Nelson & Nelson*, no. 5805; FIG. 8, disk-corolla,  $\times 5$ , from Pyramid Lake, Jasper Park, Alberta, *J. M. Macoun*, no. 96,019; FIG. 9, achene,  $\times 5$ , from Ross Hole, Montana, *S. Watson*, no. 232.